



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

1595 Wynkoop Street  
DENVER, CO 80202-1129  
Phone 800-227-8917  
<http://www.epa.gov/region08>

July 11, 2012

Ref: 8EPR-N

Sherry Hazelhurst  
Acting Forest Supervisor  
Grand Mesa, Umcompahgre &  
Gunnison National Forest  
2250 Highway 50  
Delta, Colorado 81416  
[comments-rocky-mountain-gmug@fs.fed.us](mailto:comments-rocky-mountain-gmug@fs.fed.us)

Re: West Elk Coal Mine, Federal Coal Lease  
Modifications COC-1362 & COC-67232  
DEIS, CEQ # 20120160

Dear Ms. Hazelhurst:

The U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the *Draft Environmental Impact Statement (DEIS) for the Federal Coal Lease Modifications COC-1362 and COC-672324* for the West Elk Coal Mine. As described in the DEIS, the proposed lease modifications would add approximately 1.6 years to the approximately 11-12 years of mining under existing leases at the West Elk mine. This underground coal mine is located near Somerset, CO and is operated by Mountain Coal Company (MCC), an Arch Coal subsidiary. Our comments are provided for your consideration pursuant to our responsibilities and authority under Section 102(2)(C) of the National Environmental Policy Act (NEPA), 42 U.S.C. Section 4332(2)(C), and Section 309 of the Clean Air Act, 42 U.S.C. Section 7609.

We appreciated the opportunity to discuss and provide feedback to the U.S. Forest Service and the Bureau of Land Management (BLM) in May regarding the proposed West Elk lease modifications. We also appreciate the efforts to address our preliminary suggestions. Based on our recent discussions and review of the DEIS and its attachments, the EPA is offering comments on one major topic: greenhouse gas mitigation. We are also offering additional more detailed technical comments via Enclosure 1 of this letter.

**Comments on Greenhouse Gas Mitigation:**

The DEIS considered but did not analyze in detail any alternatives to reduce the potential greenhouse gas emissions of the project through methane capture/use or flaring. According to the DEIS, the reason these alternatives were eliminated from detailed study was that their use was deemed economically infeasible in the *West Elk E-Seam Gas Economic Evaluation Report*, dated September 24, 2009 (2009 Report). This

report, which was prepared under the direction of the mine owner, Mountain Coal Company (MCC), contains a detailed economic analysis of various greenhouse gas reduction options and concluded that greenhouse gas reduction for the entire mine was not economically feasible. We therefore have three recommendations:

1. Amend the FEIS Alternatives Section or add a new FEIS section to include a discussion about how individual methane mitigation technologies could be utilized at the mine. As you know, the DEIS and the 2009 Report looked at a full suite of these technologies, but the DEIS did not explain how these technologies could be used as mitigation measures. One way to reconsider this would be to add a table to the FEIS containing the following information: (1) methane reduction options evaluated; (2) whether the technology could be applied to mine drainage well emissions (MDW) (more concentrated methane), ventilation air methane (VAM) (more dilute concentrations) or both; (3) the pros and cons of each technology; and (4) identification of the more promising mitigation measures and why they are promising.

Given the key role the 2009 Report plays in the DEIS conclusion not to require any greenhouse gas emissions reduction technologies, the EPA reviewed all available portions of the Report (note, some portions were deemed “Confidential Business Information”). From our review of the Report, and knowledge about advances in commercially available technologies, we believe several of the technologies may warrant further evaluation as mitigation measures for a portion of the methane from the mine. Specifically, the following mitigation measures could reduce the projected capital and operating costs associated with methane collection while still providing a reduction in methane emissions:

- Collect and use/flare a portion of methane from the mine instead of collecting all of the methane as evaluated in the 2009 Report
  - Reduce winter operations to reduce seasonally higher operation and maintenance and construction costs
  - Reduce the number of internal combustion engines generating power from methane from four (as analyzed in the 2009 Report) to two engines, and flaring any methane greater than the capacity of the generators.
2. Require MCC to periodically update its evaluation of the economic and technical feasibility of mitigating greenhouse gas emissions and develop a proposal to implement those mitigation measures demonstrated to be feasible. We note that our recommendation is consistent with BLM’s requirement that MCC prepare an annual evaluation of the economics associated with the capture and/or use of coal mine methane and vent air methane, as discussed in BLM’s March 25, 2009 letter to MCC (Enclosure 2). Periodic reevaluations are important because energy price fluctuations can affect the cost-effectiveness of mitigation measures. For example, measures that currently may not be economically feasible may become feasible with coal price increases. Encourage MCC to take advantage of several opportunities to employ current commercially green house gas emission reduction strategies. Although we do not anticipate that these changes will be made as part of the FEIS, we do recommend that they be considered by MCC for use at the West Elk mine.
  3. Explore non-traditional options for improving the economic feasibility of methane mitigation measures such as developing a greenhouse gas offset proposal to attract funding from outside investors. The recently announced Elk Creek coal mine methane capture/ carbon offset project to

generate electricity from methane emissions with a \$5.4 million investment from the Aspen Skiing Company serves as a good example of this recommendation. This collaborative partnership among the mine owner, a coal gas company, the local electric cooperative, and the Aspen Skiing Company, facilitates methane emissions capture and the conversion of the methane into approximately 3 megawatts of energy that the Aspen Ski Company will use to offset 100% of its energy consumption.

### **EPA's Rating**

Based on our review, the EPA is rating the DEIS as "Environmental Concerns -- Insufficient Information" (EC-2). The "EC" rating means EPA's review has identified potential impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts. The "2" rating means that the DEIS does not contain sufficient information for the EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment. EPA's rating system is described at: <http://www.epa.gov/compliance/nepa/comments/ratings.html>.

Thank you for the opportunity to review the DEIS. If you have any questions or would like to discuss our comments, please contact me at (303) 312-6925. You may also contact Dana Allen, lead reviewer for this project, at (303) 312-6870 or by email at [allen.dana@epa.gov](mailto:allen.dana@epa.gov).

Sincerely,



Suzanne J. Bohan  
Director, NEPA Compliance and Review Program  
Office of Ecosystems Protection and Remediation

Enclosures

cc: Barbara Sharrow, BLM Uncompahgre Field Office  
Leigh Espy, Deputy State Director, BLM Colorado State Office

**EPA's Detailed Comments**  
***Federal Coal Lease Modifications COC-1362 & COC-67232 for the***  
**West Elk Mine**

**Additional Detailed Comments on DEIS**

EPA Comments on Section 2.2 Alternatives Considered but Eliminated from Detailed Study: *Reduce the potential GHG emissions of the project through methane flaring, methane capture, or through the use of ventilation air methane (VAM)* (pages 33-37)

1. We suggest revising the sub-sections entitled Flaring & VAM, Methane Capture & VAM, and VAM Technology (including RTO) to differentiate between the mitigation measures used for reducing greenhouse gas emissions from the methane drainage wells (MDW) (which emit more concentrated methane emissions) and mitigation measures used to dilute ventilation air methane (VAM). For example, it should be noted that flaring is an appropriate mitigation technology only for MDW methane emissions and not for reducing methane emissions from VAM as was suggested on page 35 of the DEIS.

EPA believes that appropriate mitigation technologies for VAM emissions would be thermal or catalytic oxidation, converting methane to carbon dioxide. We recommend that the sections regarding the feasibility of VAM technologies (on page 66 of the FEIS) be revised to reflect the commercial availability of VAM oxidizers that could handle the large air volumes anticipated at the West Elk mine. We also suggest separating discussions regarding the potential difficulties associated with siting the VAM oxidation equipment at the West Elk mine from the discussions of the overall technical feasibility of VAM oxidation.

2. We recommend that the FEIS explain that since 2009, the Mine Safety Health Administration (MSHA) and state mining regulatory agencies have had increased experience with the reliability and safety of coal mine methane (CMM) mitigation equipment such as ventilation air methane (VAM) oxidizers and flares for more concentrated mine methane releases. In particular, the commercial availability and regulatory acceptance of technologies for VAM oxidation has improved since the 2009 study. See the comments in the next section for more information about recent installations of these technologies.
3. The description of the regenerative thermal oxidation (RTO) on pages 36 and 65 of the FEIS should be revised to be more technically accurate (see last paragraph starting with “*adsorption media at the gas inlet to separate out and concentrate VAM exhaust to the particular saturation point of the media . . .*”).<sup>1</sup> Specifically, the discussion should clarify that the ceramic media in RTOs does not adsorb methane and does not need to be regenerated by heating. The ceramic media is inert and is placed in the RTO bed to provide even distribution of the gas and thermal energy (heat).

For future alternatives analyses, it should be noted that mines can recover energy from RTOs in contrast to the information in the last paragraph on page 65. RTOs can supply direct thermal energy to the mine (for heating of air and water, etc.) or generate steam which may be used in a

---

<sup>1</sup> The Verdeo VAM analysis accurately describes several specific commercially available technologies and lists specific vendor websites for more detailed information. See also the EPA Coalbed Methane Outreach Program resources related to VAM: <http://www.epa.gov/coalbed/resources/vam.html>

steam turbine electric generator. For example, the WestVAMP project in Australia, which began operating in 2007, generates 5 MW of electricity from their VAM oxidation system utilizing a high efficiency heat transfer system to drive a steam turbine.

4. To support full disclosure, the discussion on pages 36, 37 and 66 should acknowledge that revenues for carbon credits are available via several existing markets. More specifically, there currently is a market for carbon credits in the United States. Relevant information, including methodologies for coal mine methane capture projects, is likely available from the four carbon registries that currently exist in the U.S.
  - Climate Action Reserve (CAR) - [www.climateactionreserve.org](http://www.climateactionreserve.org)
  - Verified Carbon Standard (VCS) - <http://v-c-s.org>
  - Chicago Climate Exchange Offsets Registry - [www.theice.com/ccx](http://www.theice.com/ccx)
  - American Carbon Registry (ACR) - [www.americancarbonregistry.org](http://www.americancarbonregistry.org)
5. It appears that the statement on page 34 of the DEIS “West Elk does use some methane liberated from the mine to heat air at surface openings of the mine to prevent ice build-up” is no longer accurate. It is EPA's understanding that as of June 2012, the West Elk mine heating project was discontinued and the equipment has been sold to another mine. That project combusted methane in enclosed horizontal flares for mine heating, which operated for several weeks in the winter time for a number of years. The methane came from a sealed mine district and the combustor fuel was piped through the mine to a location near the vent shaft, through a vertical borehole and pump station. Please correct or clarify this in the FEIS.
6. We recommend that the FEIS clarify whether there are situations when royalties would need to be paid for use of methane from the mine, since this could affect the economic feasibility of mitigation measures. The current and proposed revisions to the lease stipulations authorize the mine to use or combust methane that would otherwise be vented for safety purposes, without having to pay royalties. However, the DEIS does not clearly explain whether royalties would need to be paid if the gas is sold or if the methane is used to generate electricity that is sold. In particular Section 2(C) states that . . . *"Leasees shall have no obligation to pay royalties on any coal mine methane that is used on or for the benefit of mineral extraction at the West Elk coal mine. When not inconsistent with any express provision of this lease, the lease is subject to all rules and regulations related to Federal gas royalty collection in Title 30 of the Code Federal Regulations"* . . . Please clarify whether royalties would need to be paid if methane or electricity from the West Elk mine was used elsewhere.
7. We recommend that the FEIS clarify that MCC could voluntarily implement methane mitigation measures even if the measures were not considered to be economical under current assumptions. The DEIS appears to suggest that MCC would be prohibited from implementing mitigation measures if the methods were not cost effective.

### **Additional Detailed Comments on the MCC 2009 Report**

1. **Commercial VAM Technologies.** The commercial availability and regulatory acceptance of technologies for oxidation of VAM has improved since the 2009 Report. There are currently two VAM oxidation projects operating at active underground U.S. coal mines: the JWR Mine 7 in Alabama, which has been operating since January 2009, and the CONSOL McElroy mine in West



Virginia. A third project is currently under development at a CONSOL mine in Pennsylvania (Enlow Fork Mine). These projects have been reviewed and approved by MSHA.

These three U.S. projects use two different technology vendors. Globally, there are VAM oxidation projects at about ten active underground coal mines including mines in Australia and China. Several VAM oxidation projects recover and use the energy for heating or electricity generation using commercially available technologies. These VAM mitigation projects have all been undertaken in the absence of regulatory requirements, and a number of them are receiving financial revenues based on their carbon emissions reductions.

2. **Capacity of VAM oxidizers to handle large volumes.** VAM oxidizers are capable of handling very large air volumes. The units are modular and multiple units can be configured to handle the appropriate ventilation flow rates.<sup>2</sup> In fact, several coal mines in Australia and China that have large air flows have installed VAM oxidation units. The modular design of these systems provides the flexibility to increase or decrease capacity, depending on shaft location and exhaust air flow rate as the location of mining activities change. In addition, RTOs are not directly connected to the exhaust shaft and therefore, they are adaptable to various exhaust shaft configurations.
3. **Applicability of VAM oxidation based on site-specific conditions at West Elk.** VAM oxidation systems typically operate in the range of 0.2-1.2% methane. Based on the 2009 Report which included an economic analysis conducted for West Elk, MCC predicted that the VAM concentration at Shaft #4 will range between 0.15% - 0.31%, and therefore concluded that the lower end of this operating range would make VAM mitigation a non-viable alternative.

EPA recommends that the reevaluation include the option of combining high-methane concentration gas from the MDW with the VAM, to boost the lower end of the concentration range so that it would be maintained at a sufficiently high level to make a thermal oxidation system self sustaining. This is being done in Australia at the WestVAMP project, where BHP Billiton is blending drained gas with the VAM, in order to boost the methane concentration to 0.9%, as well as to even out any variations in methane concentration of the VAM.

It is also not clear whether the predictions of the VAM concentrations used in the 2009 Report are still accurate and whether if they were updated the technological prognosis would change.

4. **VAM Technology Safety.** It should be noted that VAM systems are designed with safety features in mind. For instance, for safety purposes, a physical gap is created between the exhaust shaft (evasé) and oxidizers, so the oxidizer is not directly attached to the mine ventilation system and therefore does not impede air flow from the mine fan. Since the RTO intake is physically and electrically separated from the exhaust shaft, it removes any potential impact on the ventilation system if there were to be a sudden stoppage of airflow to the RTO (or RTO system failure). Another safety feature includes automatic dampers to immediately block airflow to the RTO whenever methane concentrations in the ventilation shaft airflow reach a certain threshold. Another safety feature is the length of the ducting between the ventilation exhaust shaft and RTO intake (approximately 100 feet), which is designed to allow sufficient time to actuate the damper and stop flows into the RTO in the event of a high methane concentration detection.
5. **Flaring:** EPA recommends that the reevaluation include additional information regarding the potential feasibility of flaring the methane from the vent wells (MDW). While the Arista report (Appendix F to the 2009 Report) included cost estimates for two flaring scenarios, and the Burns and McDonnell report (Appendix G to the 2009 Report) used the Arista information to evaluate

---

<sup>2</sup> <http://www.megtec.com/documents/MEGTEC%20VAM%20Processing.pdf>

the feasibility of installing power generation capacity and evaluated the economic feasibility of all the options, the DEIS evaluation did not provide or discuss any monetary benefit to flaring as a mitigation option such as carbon credits which could improve the economic feasibility of flaring. Furthermore, EPA believes it is worth disclosing the potential health and safety benefits attributable to using a flare to destroy VOCs and hazardous air pollutants (HAPs). More specifically, flaring of methane gas is a standard safety practice in many industries and is routinely used during processing and production of oil and gas, from landfill collection systems and the petroleum industry. Flaring appears to provide substantial benefit with less capital cost than flaring and power generation.

The reevaluation of flaring should also disclose the increasing commercial availability and acceptance of flaring by regulatory agencies. The MSHA safety concerns expressed in the DEIS (page 35) do not make flaring infeasible. It is EPA's understanding that MSHA has not received or reviewed any applications for flaring at a U.S. coal mine. EPA agrees with the characterization in the DEIS that describes MSHA's policy of reviewing mine applications for flaring on a case-by-case basis. MSHA does not have an official policy on flaring of gas at coal mines, therefore MSHA would review each flaring plan individually to ensure that it adequately incorporates appropriate protections such as bubble traps, fail-safe valving, flame arresters, or monitoring and control systems.

MSHA has in fact authorized a flare for mine methane from a mine degasification system that was commissioned in August 2010<sup>3</sup> and is now operating at Solvay's underground trona mine near Green River, Wyoming.<sup>4</sup> It is EPA's understanding that Solvay now intends to utilize the gas for productive use in their processing plant. Trona mines have similar characteristics to underground coal mines in terms of their methane gas production and degasification technologies, and the experience at the Solvay trona mine should be applicable to underground coal mine operations.

While there are currently no United States underground coal mines operating with flares, there are approximately 23 installed coal mine methane flares elsewhere in the world. Methane flaring at underground coal mines has been approved as a safe practice by national level mine safety oversight agencies in the United Kingdom and Australia. Flares can combust methane in air with fluctuating concentrations between 30 to 100 percent by volume. Portable flares are also commercially available, to provide flexibility to move to different wells.<sup>5</sup>

---

<sup>3</sup> [http://www.sindicatum.com/portfolio\\_item/coal-mine-methane-us-solvay-wyoming/](http://www.sindicatum.com/portfolio_item/coal-mine-methane-us-solvay-wyoming/)

<sup>4</sup> [http://www.epa.gov/coalbed/docs/cmm\\_conference\\_oct10/Sherer.pdf](http://www.epa.gov/coalbed/docs/cmm_conference_oct10/Sherer.pdf)

<sup>5</sup> [http://www.globalmethane.org/documents/toolsres\\_coal\\_flaring.pdf](http://www.globalmethane.org/documents/toolsres_coal_flaring.pdf)



## United States Department of the Interior

### BUREAU OF LAND MANAGEMENT

Colorado State Office  
2850 Youngfield Street  
Lakewood, Colorado 80215-7093  
[www.blm.gov/co](http://www.blm.gov/co)



In Reply Refer to:  
3420 (CO-921)  
C-1362, COC56447, COC67232

JAN 25 2009

Gene E. DiClaudio  
President  
Mountain Coal Company  
One Cityplace Drive, Ste. 300  
St. Louis, MO 63141

Dear Mr. DiClaudio:

As a result of the January 16, 2009 addendum to the West Elk Leases and the language contained in the Technical Revision No. 111 and PR 14 approval documents, the Bureau of Land Management (BLM) is requiring that Mountain Coal Company supplement the existing Resource Recovery and Protection Plan (R2P2) to comply with the language contained in the addendum and the approval document.

The Revision No. 111 and PR 14 approval document directs Mountain Coal Company to collect all economical Coal Mine Methane (CMM) and Vent Air Methane (VAM) that would normally be vented for the safety of the miners and compliance with applicable MSHA regulations. The addendum to the Mountain Coal Company leases provided a mechanism that allows for the capture and use of the CMM and VAM. To ensure compliance with the addendum and the approval document Mountain Coal Company must supplement the existing R2P2 to include an annual evaluation of the economics associated with the capture and/or use of the CMM and VAM. The economic evaluation should contain at a minimum the following:

- An analysis of the costs associated with collection of vented CMM from holes developed specifically for the purpose of the venting of the CMM for safety purposes.
- An analysis of the costs associated with collection/capture of VAM
- All costs associated with the collection of the CMM that is above and beyond what is associated with normal venting operations including but not limited to construction of gathering systems, roads, pipelines, etc.
- All costs associated with putting the CMM or VAM in a marketable condition including compressing and refining systems and transportation to the point of sale.
- An analysis of the costs associated with collection and beneficial use of CMM or VAM.
- All projected revenue from the sale of the CMM or VAM.



- Any carbon credit offsets acquired as a result of the capture/sale of the CMM or VAM must be taken into account.
- The economic evaluation will include a reasonable cost of capital and employ commonly used analytical tools used in project finance, such as a discounted cash flow analysis.

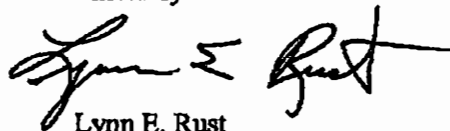
CMM or VAM that is used on site for beneficial use will not be subject to a royalty. Beneficial use includes all uses of CMM or VAM onsite including fueling mine heaters and the generation of electricity that is used onsite at the West Elk Mine. Vented or flaired CMM or VAM that is not economic is not subject to a royalty.

All activities associated with the beneficial use or economic collection and sale of CMM or VAM must be approved in a supplement to the R2P2. The R2P2 must be supplemented to include the methods and equipment used to measure all CMM or VAM that is used for beneficial use or sold. The measurement of CMM or VAM sold should comply with the applicable measurement regulations found at 43 CFR 3162.7-3 and Oil and Gas Onshore Order No. 5.

Within six months of receipt of this letter Mountain Coal Company is required to provide to the appropriate Bureau of Land Management office an economic evaluation of the capture and use of the CMM and VAM and a proposal detailing the equipment and methodology to be used in monitoring the CMM or VAM production. The reported produced value for VAM should be the same value currently reported to the BLM as part Mountain Coal Company's methane venting submittal until such time that capture of VAM is considered economic at which time a detailed submittal outlining equipment and methodology will be required.

If there are any questions or concerns please feel free to contact Charlie Beecham, Branch Chief for Solid Minerals at (303) 239-3773.

Sincerely

A handwritten signature in black ink, appearing to read "Lynn E. Rust", with a stylized flourish at the end.

Lynn E. Rust  
Deputy State Director  
Energy, Lands and Minerals